

Abstract

Moisture in porous rocks causes material degradation and weathering. However, very little is still known about its dynamics, spatial distribution, and sources. This thesis presents three examples of the study of moisture distribution and fluxes in rock outcrops with cavernous weathering forms: coastal honeycombs in Italy, tafoni in a humid climate near Kralupy nad Vltavou, Czechia and the transition from inland notches to tafoni in carbonates in Israel. At all sites with tafoni and honeycombs, the depth of the evaporation front inside the caverns is closer to the surface than outside most of the time, except after heavy rainfall or, in the case of the coastal area, after more intense surf. The lower depth leads to a higher evaporation rate from the caverns and higher precipitation of salts, causing active salt weathering there. For the first time, the spatial and temporal distribution of the evaporation front on outcrops with cavernous weathering has been determined. This allows a better understanding of the evolution of these forms. For the first time, the amounts of precipitated salts were calculated from evaporation rates for natural rock outcrops. At the Kralupy site, water influxes and outfluxes from/to the tafoni were determined, from which a water balance of the arcotic sandstone outcrop was constructed. The results presented here show that knowledge of the moisture distribution and the determination of the evaporation rate are essential for understanding and quantifying weathering processes and for determining the water balance of rock outcrops.